THE

YOUNG MECHANIC.

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OBSERVATIONS ON DRAWING INSTRUMENTS.

[Continued from p. 99.]

THE TRIANGULAR COMPASSES.

The Triangular Compasses are a very useful instrument for determining the distance of any one point from two others, given in position. They simply consist of a common pair of compasses to whose head a joint and socket is fitted for the reception of a third leg. The third leg being connected to the others by a universal joint, as it were, can be moved in any direction, either from or towards the draftsman, or to the right or left.

The wholes and halves will sometimes be found convenient for dividing lines into two equal parts, deriving their name from this property. To use them, open the longer legs so as to take in the required line, then invert the compasses and the shorter legs will contain just half of it.

Proportional Compasses have points at each end; the centre or joint, being moveable, is between them. They are for reducing drawings in any required proportion; thus any distance being measured between the two long points, by inverting the compasses, the short points will give a distance in any required proportion to the former, by altering the position of the centre or joint. The limbs or legs have grooves made in them, the sides of which are cut in a dove-tailed form, and pieces of brass to match, are fitted into them. These two pieces are united together by a steel pin, which passes through them, having a head on one side and a milled nut on the other, for clamping them together and fixing them fast in every part of the grooves where they may be set. When this nut is loose and the shanks are closed, by applying the finger and thumb to the sliders they may be moved up and down in the grooves, and the centre set in a situation for any required proportion, by means of scales on each side of the grooves and an index on the slider. The scale on the right hand of the first side is entitled *lines*, numbered from 1 to 10. By this scale a straight

line may be divided into any number of equal parts expressed on it. The compasses will then reduce a drawing in any proportion, by measuring the distances of the original by the large points and transferring them to the copy by the opposite points. The two legs when closed, are prevented from slipping on one another, by a small stud or projection which is formed in one and enters into a notch made in the other. On the opposite edge is a line of divisions entitled *circles*. Being numbered from 1 to 20, the points may be opened in any proportion of the radius of a circle to the side of an inscribed regular polygon from 3 to 20 sides. Two other lines of divisions are placed on the back, one entitled *plans*, and the other *solids*. These lines are for finding the square or cube root of any number. The areas of similar plane figures, being to each other as the squares of their sides, and the solidities of similar solids being as the cubes of their homologous sides, these compasses will be found very useful in ascertaining the proportions of any two similar planes or solids to each other. Thus, set the index to the division 4 on the line of *plans*, and measure the side of any square or right lined figure, and the distance between the short points will indicate the side of a figure the area of which is one fourth of the other.

The line of *solids* may be used in the same manner for determining the proportions between cubes or spheres. Set the centre on division 3, and then measure the diameter of a sphere or side of a cube in the long points, and the distance in the short points will denote the diameter or side of a similar solid of $\frac{1}{3}$ the cubic contents of the former.

The best kinds of proportional compasses are provided with an adjusting screw and clamp, precisely similar to that before described as sometimes attached to the dividing or measuring compasses.

The Pocket Compasses are a very valuable little instrument, being as it were, a complete set of drawing instruments united in one. The shanks meet in a joint at the top and are hollow for the reception of the legs, which are each formed into two distinct instruments having a joint in the middle. One leg is composed of a plain point at one end and a pencil at the opposite; the other consists of a plain point as before, and a pen at the other end. The joints are formed above and below, like the joint to the shifting leg of the drawing compasses, and fits into the sockets in the end of the shanks. This admits of either point being brought into use, for either end of the leg may be introduced into the hollow of the shank, and then the opposite end will be in use.

This instrument is very convenient on account of its portability; for the points or legs being put into the sheaths which are provided for them, may be turned inside of the shanks, and the instrument carried about in the pocket without any case. The shanks may be formed like the tubes of a telescope, so as to be drawn out to describe circles of large radii.

An instrument of this kind was invented by M. J. Brund, an

English civil engineer, the legs of which, instead of fitting into the shanks, turn in the centre on screws, in the end of the shanks. In this way, the points may be changed very readily, simply by inversion. This is a much better contrivance than the former, as by its construction all shake or looseness is avoided. When the tubes of which the shanks are composed, are drawn out, the compasses will describe a circle of twenty inches radius, although they are when closed, only four inches in length.

The beam compasses are used for measuring long distances and describing circles of very large radii. They consist of a long beam of brass or wood, and two brass sliders fitted upon it. One of these which contains the pen or pencil point is fixed upon the end of the beam, and sometimes has a micrometer screw for accurate adjustment, the other, being moveable along the beam, may be confined at any spot by a clamping screw in the top.

In the best instruments the hand of the micrometer screw has divisions cut on it, by which the quantity the point is moved, may be ascertained with great precision. The compasses are often provided with duplicate plain beams, which may be attached to the first by a slider with two screws. When arcs of circles of very large radii are to be drawn, the beams are very liable to bind by their own weight; and this, throwing the points from each other, destroys all accuracy. This may be remedied by having sliders, with small wheels attached to them, to roll upon the paper, which may be confined in the centre or any part of the instrument.

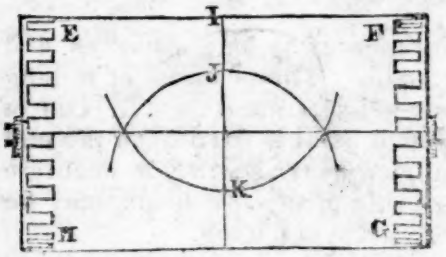
We have now described all the compasses which are worthy of notice; for though there are various other kinds in use among artists, yet none are so perfect as the above . We shall conclude by giving a few remarks on sharpening the compasses. When the points by gradual wear, become dull or blunted, they are to be repaired on an oil stone or hone. The insides of the points should at first be laid very flat on it, and rubbed steadily along the surface, till on shutting them together, the two points meet as one. They are then to be closed fast, by winding a string round them or in any other convenient way, and both points to be rubbed at once and sharpened as if they were but one point. After this is done they should be opened and the ends of the points polished, to preserve them from oxidating.

No accurate measure can be taken in compasses, the joints of which are tight, so as to cause the legs in opening or closing, to spring, because when the points are brought to the required distance by the fingers, they alter the instant the pressure is removed; which variation in some compasses amounts to a very considerable quantity.

MECHANICAL GEOMETRY.

Under this head we intend to give examples, showing the application of geometry to mechanical purposes. The following is from the London Mechanic's Magazine.—Eds.

Proposition.—To draw a line upon the surface of a cylinder, which shall be exactly parallel to the axis. Suppose E F G H to be the contour of a cylinder; apply any point while revolving at or near the middle, so as to describe a ring upon the surface, as at I; then set your compasses at any convenient distance, say at K, and make the arc J; then set the point at J, and make the arc K; a line drawn through the intersection will be parallel to the axis.



MEMOIR OF A MECHANIC.

Messrs. Editors,—Your politeness in publishing several articles of mine, has induced me to send the following sketch for your disposal. Philo.

I was born in England, on the 22d of August, 1790, about 100 miles from the metropolis, and one mile from a market town, in the north-eastern part of the country. My parents, though poor, were honest and industrious. Neither of them could read or write; and feeling this deficiency, they were determined to do what they could for their children, (five in number, two older and two younger than myself.) They put me, at the age of five or six years, to a school kept by a woman; and, at seven years old, I was sent to a school-master in the adjacent market town, for two years, except during harvest time, when I was taken away to assist my mother in gleaning; which is a great help to the poor in that part of the country.

My schooling was paid for by a benevolent lady, who, while she lived, kept six boys and six girls at school for two years each; one half of whom left school every year, to give place to new ones.

Sometimes it was difficult to find suitable children to send. In my own case, I was sent a year earlier than was usual, and that to fill a vacancy occasioned by a boy being taken from school, after three months' trial. He was a dunce, and in the habit of playing truant. This the master could not allow; as his credit was at stake,—for this lady obliged him, with his twelve scholars, to attend at her mansion every year, where each used to read and answer questions. She would enquire of those about to leave school

what books they had; and order the master to furnish such as she thought they needed most. After this ceremony was over, she gave each of us a shilling, and told us to proceed to a room, where we sat down to a sumptuous dinner, and were attended by the servants.

I feel it my duty to record the goodness of this amiable woman. She not only instructed the ignorant, but fed, warmed and clothed those who stood in need of it. I made the best of this opportunity, to get a little learning, which was confined to reading, writing and arithmetic; and was tolerably quick at the latter. When I left school, I had reached the Rule of Three, and was about nine years old. My father, being a day-laborer, had no particular employment for me; so, to keep me from mischief, I was set to spinning wool by hand, for a year or more; when I was released to take care of a flock of sheep, feeding by the road-side in the day-time, and turned into a field at night. I disliked this employment very much, through fear of losing any of them; and I often counted them many times a day. They often broke into other persons' enclosures. At such times, they were very noisy; the old ones would call their young towards them whenever they were about leaping a fence. In fact, I became so tired of their noise, that the bleating of sheep gave me pain for years afterwards.

I was next engaged to work in a garden for supplying the market, until I was between twelve and thirteen years of age, when I was apprenticed to a trade. My father had some notion of putting me to the trade of a painter and glazier; but I did not like the idea of working so much on ladders and temporary stages, suspended in front of lofty buildings. I had, finally, to decide between the trades of a carpenter and a whitesmith. I made choice of the latter; and do not recollect that I have regretted it, although I have practised that and similar branches for about thirty years, commencing April 6th, 1803.

My agreement was to serve seven years, and receive a certain sum of money weekly as wages; and if I served my time out duly and truly, my master promised to give me ten pounds. My father was to find me in board, lodging and clothing; and as he lived about a mile from my master's shop, I had that distance to walk every morning and evening. We worked from six in the morning until seven in the evening, taking out an hour and a half for meal times. On Saturday night we left work at six o'clock.

I had not been long at my trade, before I found the benefit of my schooling. There were two other apprentices, much older than myself, neither of whom could take an account of the work as it was delivered from the shop. The foreman was very glad to put this task upon me; and I was as willing to do it. The master was engaged in his sale-shop (hard-ware store), and the apprentices were occasionally called upon to assist when he was absent, or on a market day. This, together with the great variety of work done in our shop, afforded considerable scope for the abilities of any young man. We either made or repaired almost every article made of metal, used about a house, whether in its structure, or in

the domestic department, together with tools used by mechanics, and some work for mills.

The first money I received was at Christmas time, when the apprentices have the privilege to call on their masters' customers for a Christmas box. My share was about half a guinea, with which I bought a Bible containing the Apocrypha, as I wished to have it complete, and a thick ciphering-book. At the beginning of the year 1804, I began arithmetic anew, going through more thoroughly than I had done at school; writing in every rule and case, and using a greater variety of examples. I sought advice and assistance from anybody and everybody that came in my way. One of the most efficient of my advisers, was a journeyman carpenter. He had several books full of examples in mensuration of superfices and solids, embracing the methods of measuring various kinds of artificer's work. The figures or diagrams were very neatly drawn. I had several lessons of an evening from this man, but he was soon taken away, having to undergo a surgical operation for a complaint. He died a few days afterwards. His books were purchased of the widow by his employer, a numskull at writing, whose accounts were kept by his wife.

This employer used to delight in teasing his journeyman about his knowledge. 'Tom,' says he, sitting one day at a tavern, 'there is a coach going by; tell me how many times the hind-wheel will turn round in going to London.' 'Give me the size of it,' was the reply. 'O, any fool can do it so; you ought to tell without that.' He was often treated so in company, by way of derision. Thus, people undervalue what they cannot reach. 'Ah!' says the fox, looking up at the grapes, 'they are sour things!'

Sometimes, however, poor Tom had the advantage over his employer. The lady I have spoken of, wrote to the carpenter, requesting him to build a pheasant house, to be placed in a shrubbery near the mansion. The form was to be a hexagon, if the thatcher could thatch it of that shape. He soon began to coax Tom, to get him into a good humor; for he verily believed him to be the only man from whom he could learn the number of sides in a hexagon. Tom referred him to his brother John and others, but to no purpose. At last he told this very cunning man the number of sides it contained. By purchasing Tom's books, he expected to be able to beat everybody in the neighborhood. I wished to obtain them, but that was impossible.

I was never more sorry at the loss of a relation, than I was at losing this man, as I had made up my mind to study as much as I could with him.

My leisure time was now devoted partly to study, and partly to mechanical pursuits. I made several curious articles during my apprenticeship; the one of most consequence was a clock. The death of my friend gave me an opportunity to purchase a small bench-vice, and some other tools of his widow. I made myself a small lathe, chiefly of wood, and several other tools, before I commenced on my clock. It was in the examination of a large church

clock, that my attention was first drawn to this subject; the wheels being large, it looked much more simple than a common clock. The principal difficulty I apprehended, was in the motions necessary for the hands; where some of the axes passes through the others. The materials to which I had access, were not very suitable for the work; however, I commenced operations. It will be understood, that, as I lived so far off, my meals were taken in the shop, my mother putting what was necessary for me to take every morning, into a small basket. This plan gave me considerable time to prepare those parts at the shop, that I could not do so well at home. (My master never expressed any objection to my amusing myself in this way: in fact he did not trouble himself about it.) I prepared two plates of sheet-iron for the frame: these were kept at a suitable distance apart by four pieces of iron wire, which were rivetted into the back plate—the front plate was moveable. These plates were bushed with brass wherever it was necessary for the pivots of the several axes to pass through them. This, in point of utility, was as well as though the plates had been made wholly of brass. The wheels were of sheet brass, cut from the bottoms of old brass kettles. It was too thin, but was the best I could get. Having prepared my wheels, and fastened them on pieces of wire, the turning, dividing and cutting the teeth were performed at home.

I often smile, when I think of the scene presented when I first began. It was winter time; my mother was sitting on one side of the fire, and the other was occupied by some members of the family. Being very cold, that side of the table farthest from the fire was vacant. I screwed my vice on this side, and pinched my lathe in the vice, putting my axle, with the wheel on it, between the dead centres of the lathe. The motion was given by a drill-bow, the string of which passed round a whirl, placed temporarily on the axis. This bow is moved by the left hand, while the tool is held firmly in the right. In this manner the wheels, pinions and pivots were all turned; the dividing was done by a pair of small spring dividers, and the teeth were formed with a file. Parts of the work required hammering. This was more than some of the family could endure; and it induced them to furnish me with a separate light, and I had to decamp. I found a place up stairs, screwed my vice to the bannister rail, and, with a piece or two of board, I formed a bench, and was now fixed for the winter. In the following summer I made a much better establishment in a shed in the yard, where I completed my task, to the wonderment of all the old women in the neighborhood, but not exactly to my own satisfaction; although I thought it was as well as could be expected, taking all the circumstances into view. It kept time tolerably well, and would show the hour and minute on the front dial. It had an hour hand on each side; I had never seen this before, although I had heard of it. The weight moved only thirteen inches; and required winding up once in about four and a half days.

It is impossible for any one who has never tried it, to conceive

what pleasure there is in attempts of this kind; especially when the mind marks out tracks that have never been trodden before. Sometimes months, and even years must elapse, before the object of our pursuit can be brought to an issue; during which time there is a strong belief that the thing can be accomplished; although many unforeseen difficulties occur, which set us to thinking. Here is something to study about. Now and then, a faint ray of light seems to point out the course we ought to pursue: by and by a blaze bursts as it were upon us, and the object can now be accomplished with ease. This brings pleasure somewhat in proportion to the labor spent in searching for it; or according to the benefit likely to arise to mankind, or to the individual making the discovery, modified, of course, by the disposition of the person engaged in the operation. Many times I have been bent upon the accomplishment of some object that required great attention: which I found was more easily done in the night, when the family had retired to rest, and all around was still. At such times, sleep would be banished from my eyes, there being something so fascinating in it, that the time flew unconsciously by; and I retired to bed, rather for a screen to prevent the interference of others, than for the sake of rest.

[To be continued.]

From the Franklin Journal.

ON SOFTENING CAST IRON.

The subjoined extract from the reports of Mr. Strickland (just published) will probably bring to mind some statements made in our first number, on the subject of the art of rendering cast-iron malleable, as practised in England. The *Cumberland red ore* is, it appears, found in various parts of the Island of Great Britain, and there are, undoubtedly, several varieties of iron ore in the United States, which will answer the same purpose. The Cumberland ore is probably an *argillaceous oxide of iron.* The *Hematetic Iron ore*, which consists of oxide of iron, silex and alumine, has been successfully used in England, but as it is a very hard substance, the difficulty of reducing it to powder in sufficient quantities, is a bar to its employment in the large way.

The *Ochery red oxide of iron* (red-ochre) is known to abound in many of the States, and is, probably, similar to that of Cumberland. The *Bog-ore*, so abundant in New Jersey, and in many other places, would be likely to answer the purpose, when not contaminated by phosphate-of iron. Those who are interested in experimenting upon the subject, would do well to make the essay with the several varieties of ore which they can obtain, as the comparative goodness of each might then be ascertained, in a single operation.

'There has been a method lately discovered, to make cast metal soft and malleable; and there are already many large manufactories put up, for this very important process. I have visited one of them in London, and witnessed the operation. The method consists, in placing the cast metal in a case or pot, along with, and surrounded by, a soft, red ore, found in Cumberland, and other parts of England. The cases are then put into a common oven, built with fire-bricks, and without a chimney, where they are heated with coal or coke, placed upon a fire-grate. The doors of the oven are closed, and but a slight draft of air permitted under the grate; and thus a regular heat is kept up, for seven days, or two weeks, depending on the thickness and weight of the castings. The cases are then taken out, and suffered to cool, and the hardest cast metal is, by the operation, rendered so soft and malleable, that it may be welded together, or when in a cold state, bent into almost any shape, by a hammer or vice. In this manner are all articles, such as harness buckles, bridle bits, horse shoes, and even nails, made tough and malleable. Cast horse shoes, submitted to this process, have, after being worn out by the action of the horses' feet, been converted into penknives, and other articles of cutlery, of superior quality. I have procured a specimen of the red ore used in this valuable process, together with a few articles of the hardest cast iron, which have been softened, and rendered perfectly malleable. Those castings, however, which are made from pig iron containing the smallest portion of carbon, are the best adapted for conversion into malleable iron: the only effect produced by the introduction of the red ore, along with the metal, is to deprive it of its carbon.'

BLUE COLOR OF STEEL.

Messrs. Editors,—Your correspondent, Gulielmus, having propounded several questions, relating to the process of blueing steel, I will attempt to give a few ideas upon the subject; by the aid of which, and a little experience, he may possibly succeed to his satisfaction. His inquiries are, first, the best method of producing the blue color upon iron or steel. Secondly, the cause of the color being so easily rubbed off from the piece which he tried; and thirdly, the nature of the color. To answer these inquiries, it will be necessary to reverse the order in which the questions are asked; and first, consider the nature and the materials of which the blue is composed.

All metals more or less oxydize upon exposure to the atmosphere, being partly composed of oxygen gas. An oxide of a metal is formed by the union of oxygen gas with the metal, and is, when not produced by heat, known by the common name, rust. Thus iron rust is the yellow oxide of iron. All changes which take place upon the surface of this metal, either from exposure to air, water,

or heat, is an oxide. And if, after polishing the steel or iron, it is subjected to different degrees of heat, the surface will be more easily acted upon by the oxygen of the atmosphere; and will first assume a yellowish tinge, and gradually deeper (with an increase of heat) to orange, red, blue and black, which is the last oxide formed by heat. By this it will be seen, that the blue color is the blue oxide of iron, and is composed of oxygen gas and iron.

The next question is the best method of producing the blue oxide. As Gulielmus does not inform us of the method which he adopted, in performing his experiments, I am not sure but that I shall mention one inferior to his own. It must be evident, that to produce an *equal color*, an *equal heat* must be applied. This is done by immersing the steel in melted lead or tin; or by putting it in a vessel surrounded with charcoal dust, and subjecting it, in this state, to the necessary heat. But for small articles, covering them with common house sand, instead of charcoal dust, or, if the pieces are flat, lay them on sand spread upon a plate of iron, and placed upon the fire, so that the heat must pass through the sand; which will make a good tempering bed, and produce an equal color upon the work.

It now remains for us to answer the third and last question, why was the color so easily rubbed off? This question I find some difficulty in answering; as there are several causes which would produce such an effect: but the following opinion I will submit, as the probable cause. In his communication, Gulielmus observes, that the pieces used, were of sheet iron made smooth, and burnished before blueing. I would observe here, that iron will not produce as bright a blue as steel; and the harder the steel, the more brilliant the blue, and perhaps the more permanent. The reason of the color being so easily removed, I conceive to be this; in burnishing, oil is generally used, to keep the tool from scratching, and although the work may afterwards be wiped, yet some will remain in the pores of the metal, until the heat is applied; when it will be thrown out upon the surface. This will not prevent the oxide from forming, but it will prevent it from adhering; for, as fast as the oxide is formed, it would be separated from the iron by the oil, and could be brushed off, in the manner described by Gulielmus.

J. M. W.

BOSTON MECHANICS' LYCEUM.

ORIGIN.

As this institution, owing to its somewhat peculiar character, is but partially known among the mechanics of our city, I have thought proper to prepare an account of its origin, and progress to the present time, for the Young Mechanic.

The first meeting in favor of forming a Mechanics' Lyceum in this city, was called by Mr. Josiah Holbrook, Feb. 5th, 1831. Mr.

Timothy Claxton presided, and Mr. W. S. Baxter acted as Secretary. The evening was occupied by the discussion of the question, 'Has any class of the community stronger inducement or better opportunities for mental improvement than practical mechanics?' which was decided in the negative. The meeting adjourned to Feb. 12th, for the discussion of another question, and to take into further consideration the subject of forming a Lyceum. At this meeting a proposition was made to form an association to be called the 'Union Lyceum,' and another, to form one, to be called the 'Mechanics' Lyceum,' both of which were referred to the next meeting, which was voted to be held Feb. 19th. The latter proposition prevailed at this meeting; and a committee was appointed to draft a Constitution, to be reported at an adjourned meeting, Feb. 25th. The Constitution reported by the committee at the meeting of this date, was adopted, with a few amendments. The following is a copy, with the exception of two or three amendments which have since been made—the only one of which of any importance, is the alteration of the annual assessment from $2 to $1.

CONSTITUTION.

ART. 1. The Society shall be known by the name of the Mechanics' Lyceum. Its object shall be, mutual improvement in useful knowledge.

ART. 2. Any person, having been proposed at a meeting of the Society, and elected by a vote of two thirds of the members present at a future meeting, by signing this constitution, and paying one dollar, shall be entitled to all the privileges of membership.

ART. 3. There shall be an annual assessment of one dollar on each member, payable on the first of September. No member will be allowed to attend the exercises of the Lyceum, until he has received his season Ticket; and any person neglecting to procure a ticket for one year, shall forfeit his membership.

ART. 4. The meetings of the Society shall be held once a week for discussions, lectures, or such other exercises as may be thought best to accomplish the object of its members. The last meeting in each season shall be the annual meeting, when the committee shall make a report of the doings of the past year, after which a new committee shall be chosen.

ART. 5. The business of the Society shall be transacted by a committee of five; viz. a President, Secretary, Treasurer, and two Curators, who, together, shall constitute a Board, to take charge of the affairs of the Society, and to devise and recommend such measures, as in their judgment they shall deem expedient.

ART. 6. Each member shall have the privilege of introducing ladies to witness the exercises; who may hand in compositions on the subjects under consideration, or on such others as they may choose.

ART. 7. This constitution may be altered or amended by vote of two thirds present at any regular meeting, the same having been proposed in writing, at a previous meeting.

After the adoption of the Constitution, the following persons were elected officers for the first season:—TIMOTHY CLAXTON, President; GEORGE W. LIGHT, Secretary; JAMES COOPER, Treasurer; WILLIAM S. DAMRELL and JOSEPH WIGHTMAN, Curators.

FIRST TERM.

At the first regular meeting of the Lyceum, the following list of exercises was proposed and adopted:

MARCH 5.—1. Matter and its properties. 2. Attraction. 3. Repulsion. 4. Motion from forces in the same direction. 5. Motion from forces acting in various directions. 6. Centre of gravity. 7. Essay addressed to Mechanics.

MARCH 12.—*Question.*—'Which has been the greatest benefit to Mankind, the discovery of the Magnetic Needle or the invention of the art of Printing?'

MARCH 19.—1. Lever and Balance. 2. Wheel and Axle. 3. Pulley. 4. Inclined Plane. 5. Wedge. 6. Screw. 7. Essay, Rise and progress of Mechanics' Institutions.

MARCH 26.—*Question.*—'Are Females endowed by nature with intellectual abilities equal to those of the other sex?'

APRIL 2.—1. Air, Atmosphere. 2. Weight of the Atmosphere. 3. Pressure of the Atmosphere, Barometer. 4. Common Pump. 5. Elasticity of Air. 6. Fire Engine. 7. Essay, Economy of Fuel and construction of Chimneys.

APRIL 9.—*Question.*—'Which is most conducive to happiness, ignorance or knowledge?'

APRIL 16.—1. Water, Rivers. 2. Springs. 3. Pressure of water. 4. Water Wheels. 5. Water Pumps. 6. Water Syphon. 7. Essay on the Ocean.

APRIL 23.—*Question.*—'Are the modern improvements in labor-saving machines, beneficial to the community.'

APRIL 30.—1. Printing Press. 2. Screw Standing Press. 3. Hydrostatic Standing Press. 4. Steam Engine. 5. Steam Boat. 6. Steam Carriage. 7. Essay on the Mechanic Arts.

MAY 7.—*Question.*—'Are early marriages generally advisable?'

MAY 14.—1. Definitions of geometrical figures. 2. Definitions of geometrical solids. 3. Mensuration of right lined figures. 4. Mensuration of curved lined figures. 5. Mensuration of solids with plane faces. 6. Mensuration of solids with curved surfaces. 7. Essay, History of Geometry.

MAY 21.—*Question.*—'Which has the greatest influence in forming the character of the child—the father or mother?'

The subjects of the Lectures here enumerated, together with those of the Essays, were treated upon by the members of the Lyceum—seven of them taking parts on the evenings of the Lectures, and each one occupying about a quarter of an hour. Essays on the subjects for debate, were written by females introduced by members of the Lyceum, which gave an increased interest to the discussions and exhibited a laudable talent for composition which the females of our community, especially the wives and daughters of mechanics, are seldom acknowledged to possess.

At the last meeting of the season, May 5th, the same officers were chosen for the second term, except that Mr. William S. Baxter was elected a Curator in the place of Mr. William S. Damrell.

SECOND TERM.

At the first meeting, June 7th, the following subjects for Lectures were adopted:—Architecture; Political Economy; Botany; Geology; Natural History; Astronomy; Biography of Practical Men. The members were left to choose their own subjects for Essays. At the next meeting, Sept. 27th, it was voted that Declamation should be added to the regular exercises of the Lyceum, which was afterwards found to increase the interest of the society, as well as to elicit a species of talent, and effect an improvement which has been too long and too much neglected. It also had the tendency to increase the confidence of speakers in debate.

At the last meeting, the following persons were elected officers for the third term:—TIMOTHY CLAXTON, President; JOSEPH WIGHT-

MAN, Secretary; ELISHA TOWER, Treasurer; WILLIAM S. BAXTER, and DUNBAR B. HARRIS, Curators.

As to the success of the Lyceum, thus far, notwithstanding its number of members has been small, the improvement of those who have devoted their attention to it, has exceeded the anticipation of the projectors. They now feel confident, that the plan of having the exercises conducted by the members alone, is not only in accordance with the true Lyceum system, but far more productive of solid improvement, than the mere attendance upon popular lectures. In the one case, the members acquire a habit of doing their own studying and speaking, and consequently of calling into exercise the faculties of their own minds, and using the means for improving their own manner of delivery; while in the other, most of the hearers of popular lectures retain little of the instruction they receive, and are too apt to go away with the impression, that because the lecturer's duty is performed, their own task is as certainly completed. If the former obtain only a *smattering* knowledge of science—which we maintain is not the case—the latter do not acquire even *that*. It is not my design to derogate in the least from the real merits of the popular system of conducting Lyceums. While kept within its proper sphere, it may be of extensive benefit, but I do maintain, that popular lecturing ought not to be the *regular* exercise of any institution, the professed object of which is *mutual* improvement. I am aware of the difficulty of giving very great popularity to an Association which depends wholly upon its own resources for advancement in knowledge; but still I am of opinion, that the improvement of a Lyceum depends as much upon the faithful exercise of its own powers, as that of an individual does upon his own efforts.

Among the results of the institution, I may mention the existence of this Magazine. The subject was first agitated by a number of the members, who afterwards executed all the necessary measures for its establishment.

GEORGE W. LIGHT.

AMERICAN PATENTS.

We have extracted from the Journal of the Franklin Institute, a part of the list of American Patents, which issued in January, 1832, with remarks and exemplifications, by the Editor.

For a Cement for Wood, Brick, Stone, and Iron Work: Richard Walsh, Boston, Mass. January 5.—This cement is to be made by mixing together one quart of ground lime, two of calcined plaster, and three of Roman cement. To these are to be added two pounds of black lead, one quarter of a pound of red lead, and the same quantities of copperas and of litharge.

These ingredients are to be incorporated in boiling linseed oil and spirits of turpentine, in the proportions of one part of the former to two of the latter; and it is said that when brought to a pro-

per consistence for spreading, this preparation will afford a slate colored cement, calculated to defend the material upon which it is laid from the action of the weather. The color may be varied, by mixing with the other materials any suitable coloring ingredient.

When we read the title of this patent, we expected to meet with a cement for uniting substances together, and not with a mere paint for spreading over surfaces in the ordinary way. As a paint, the composition is rather heterogeneous; some of the substances named may be left out without any disadvantage, or others may be added without abstracting from the good qualities of the mixture. The patent, however, is taken for the precise compound, and such as it is, those who use it, must purchase a right, or invade the claims of the patentee.

For a composition of matter to be used in the Manufacture of Spruce Beer: George Jones, Boston, Mass. January 27.—From the twigs, boughs, and leaves of the double white spruce, a material is to be extracted, without boiling or distillation, which the patentee calls 'the superior improved oil of spruce, for the making of spruce beer.' To form it, two pounds of the leaves, &c. are to be bruised, and soaked for three or four days in alcohol, *of a very high proof.* To every gallon of this, when filtered, three pounds of the essential oil of spruce are to be added: this is the composition for which the patent is taken.

The superiority of this composition over all others, its various uses and great virtues, are enumerated and insisted upon with considerable amplification. To make beer, one ounce of the composition and one gallon of molasses are to be well mixed together, and two gallons of boiling water are then added; a half barrel is to be used to contain the mixture, and is to be filled up with cold water, when its contents are allowed to ferment.

The process of soaking the boughs, twigs and leaves in alcohol, and then making the infusion with oil of spruce, are the things claimed.

For an improved machine for Breaking and Dressing Hemp and Flax: Ebenezer C. Chase, Jay, Oxford County, Maine, January 6.

Specification of a patent for a Wing Gudgeon Valve for Steam Engines. Granted to Thomas Halloway, *Northern Liberties, Philadelphia County, Pennsylvania, January* 18, 1832.

To all whom it may concern: Be it known that I, Thomas Halloway have invented an improvement in the valves of steam engines, which I intend to apply to locomotive operation only, and which is called the 'Wing Gudgeon Valve,' and that the following is a full and exact description thereof. I intend that the cylinder or cylinders to which my valves are applied, shall vibrate, in general, vertically; but this is not a point of importance, its position being governed by circumstances.

The cylinder is to have one large gudgeon, close to which, above and below, is a face plate, or wing, with an opening leading to each end of the cylinder, longitudinally; which face is exactly in the shape of the segment of a circle, as is shown by a model and drawings, deposited in the patent office.

The piece constituting the valve seats is cast about the width of the boiler, with a plate on each side corresponding with the face on the cylinder, and may be circular, or straight, according to the form of the top of the boiler. This valve seat has two distinct openings leading from a double division cock in the centre to the valve seats which the cylinder vibrates against, and passes out in two openings on each side, corresponding to the openings on the plate of the cylinder; and with the vibration of the cylinder it alternately receives and discharges steam.

It will be understood by every competent engineer that both the face of the plate valve seat, and that of the plate on the cylinder are to be turned perfectly true, and made steam tight, and will be kept up by a spring, friction roller or weight.

The cock, which has been mentioned, in the centre of this valve seat, and on the centre of the boilers, is to be so constructed that by turning half round, it reverses the power of the engine; that is, it makes the steam side the exhaust side, and vice versa; and it also answers to shut the steam from both engines: [qu. ends.]

What I claim as my invention, is the arrangement of the cylinders and valves to a locomotive engine; the mode of fitting the valves; the construction of the cock in the centre to determine the direction of the engine forward or backward; and the simplicity of the whole, not having half the number of pieces when completed, that the generality of English engines have.

THOMAS HALLOWAY.

Fig 1, is the face of that half of the valve which is cast on the cylinder, with openings leading through the steam ways to the two ends of the cylinder.

Fig. 2. A circular plate forming the other half of the valve, faced to fit steam tight on fig. 1. A, is an opening in it, to receive the trunnion or gudgeon B, fig. 1.

Fig. 3. A side view of fig. 2. C, the edge of the plate. D, a double tube connected with the boiler; the cock E changing either of the tubes into a supply or discharge tube.

Fig. 1.

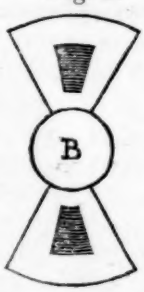


Fig. 2.

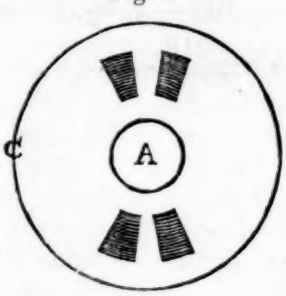
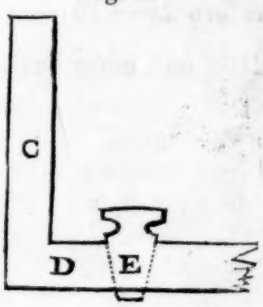


Fig. 3.



NEW STEAM CARRIAGE.

A new and very powerful locomotive steam carriage has lately been started, and is now plying upon the Glasgow and Garnkirk railway, made by Messrs. Johnson and Macnab, engineers, Port Dundasroad, Glasgow. This is the first steam carriage of the improved construction ever made in Scotland—the St. Rollox and George Stephenson, the only carriages hitherto used, having been made in Newcastle. The Glasgow, alluded to above, is propelled by two engines of seven horse power each, on which several improvements have been introduced, and, in point of speed, strength, workmanship, and appearance, is allowed by competent judges, to surpass any steam carriage hitherto seen in this country. Her speed has not as yet been fairly put to the test, this railway not being favorable to such trials, but we understand that with all disadvantages it has attained a maximum of speed hitherto unprecedented in the annals of steam conveyance, and scarcely, if at all, surpassed in those of the turf. As an instance of her power we may mention that on Wednesday, the 1st current, she drew along the line, in the ordinary course of trade, thirty-six loaded wagons, and two wagons loaded with passengers, making a gross weight of 155 tons, in the space of one hour and six minutes, including two stoppages, or at the rate of eight miles and a quarter per hour.

Scotch Paper.

QUESTION.

I should like to inquire if there is any way (in this changeable climate) of putting thin sheet lead on the roofs of buildings so that it will not crack, I think if Plumbers would turn their attention to it, it might be effected, and they would be rewarded with more work, and the public be blessed with tight roofs. P.

Answer to the first Question in the last number.

The number sought being denoted by x, the double thereof will be represented by $2x$; from which substracting 16, the remainder will be $2x - 16$; and its excess above 100 equal to $2x - 16 - 100$: therefore $2x - 16 - 100 = 100 - x$, *by the question;* whence $3x = 216$; and consequently $x = \frac{216}{3} = 72$.